

## Analýza změn duševních stavů způsobených stresem během utkání u fotbalových rozhodčích

### Analysis of changes of mental state caused by psychological stress during match in football referees

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#### Abstract

*A rank correlation between component of anxious expectations and fears before the match and component of depression after the match in the personality of football referees was statistically proven in the past. We presume that there is a possibility that this relationship is in fact qualified by the temperament of referees. We evaluated subjective psychological experiences and states of 26 football referees through standardized questionnaire SUPSO. The questionnaire had been always administrated twice: directly before the match and immediately after its finish. Using Spearman's rank correlation coefficient and partial correlation coefficient, we searched for a causal link among the values of the component of anxious expectations and fears before the match, the values of the component of depression after the match, and the referee's temperament. Results suggest that the direct bond between the two components stay significant even after exclusion of the influence of referee's temperament.*

#### Abstrakt

*V minulosti byla u osobnosti fotbalových rozhodčích statisticky prokázána pořadová korelace mezi komponentou úzkostných očekávání a obav před utkáním a komponentou depresivity po utkání. Domníváme se, že existuje možnost, že tento vztah je ve skutečnosti podmíněn temperamentem rozhodčích. Pomocí standardizovaného dotazníku SUPSO jsme hodnotili subjektivní psychické prožitky a stavy u 26 fotbalových rozhodčích. Dotazník byl administrován vždy dvakrát: bezprostředně před utkáním a ihned po jeho ukončení. S využitím Spearmanova koeficientu pořadové korelace a parciálního korelačního koeficientu jsme hledali příčinné vazby mezi hodnotami komponenty úzkostných očekávání a obav před utkáním, hodnotami komponenty depresivity po utkání a temperamentem rozhodčího. Výsledky naznačují, že přímá vazba mezi oběma komponentami zůstává významná i po vyloučení vlivu temperamentu rozhodčího.*

**Key words:** SUPSO, temperament, correlation analysis, football referee.

**Klíčová slova:** SUPSO, temperament, korelační analýza, fotbalový rozhodčí.

#### INTRODUCTION

Depending on the intensity of the stress and individual personal qualities, psychological stress can lead to a variety of consequences, from an euphoric feeling when it is satisfactorily managed to a feeling of failure and mental disintegration of the personality (Mikšík, 2007). Some accompanying phenomena, causally related to mental stress, were described. One of them is the so-called "pre-start fever", which is "characterized by extreme excitement and impulsiveness, no control of one's mental status and expressions, stemming from uncertainty, fear and nervous anticipation of further development of the situation, which leads into an enormous depletion of energy reserves

before the actual solving of the situation (Mikšík, 2007).” This can lead to mental exhaustion, apathy and reduced ability to deal with the stressful situation.

Football referees have to deal with various disputable situations during the game, and their decisions often cause negative reactions from the players and spectators, which the referees must handle. Previously (Voborný, Zeman & Blahutková, 2012), we had proven that football referees generally experience a higher level of anxious expectations and fears (U) before the game, which is one of the typical manifestations of the pre-start fever (Mikšík, 2007). We had also found statistically highly significant increase in the values of the component of depression and exhaustion (D), which has been defined by Mikšík (2007) as a tendency to passivity and apathy, during the match.

According to the founder of typological psychology, K. Lewin, a certain amount of energy is required for addressing actual specific situations in the human life. Such energy is in interaction with incentive of power field of personality. Vector of energy arises as a conflict of positive and negative powers between the need and pole of impulse action of personality (Smékal, 2004). This is how the so called biotonus, that is important in the decision-making process, emerges. Making decisions is one of the main tasks of a referee. This process is becoming more significant when addressing an actual situation during the match. Personality of a referee influences solving such situation that depends on reciprocal relation of tense. The energetic dynamics influences experiences of a football referee. Decision making influences dynamical polarity of awareness, locomotion, excitement, imperfection, completion, solution of situations during the match and the like.

Sanguine manifest a great ability of a response, openness and adaptability. They are usually optimistic, sometimes thoughtless with fast reactions, decisiveness and talkative. They are able to manage anxiety well, it does not influence them when making decisions in crucial situations. Choleric manifest experiences as a power of emotions, explosiveness and variedness of dynamics of experience. They can be aggressive and dissatisfied. Their experiences has a positive influence on strength, it sometimes has an effect on restiveness. Anxiety can have a major impact on their decision making ability not only in crucial situations. Melancholic experiences influence guardedness, sensitivity and a low ability to response, however, they are well aware of responsibility and liability. They may be sad or anxious. Thoroughness, carefulness and locomotional efficiency are typical for them. Experience of fear manifests itself more in their imagination, mainly before the match. Phlegmatic experience influences tolerance and insignificant manifestation. They are unresponsive, patient and heavy-footed. Experience of anxiety is mainly concealed (Remplein in Nakonečný, 2009).

Tension and concentration can work as limiting factors that influence decision making during a football match. Researches indicate that tension during a football match influences not only players and trainers but all participants in the match, therefore also referees (Hampton, 2006). An athlete's personality is described as a complex of reactions to tension during a sporting game and level of experiencing a sport performance. Those relations are individual (Austin et al., 2004).

According to Sayfollahpour, Ganjooee & Nikbakhsh (2013) are values of tension during performance in sport and personal characteristic of athletes always limited by age, gender and situational inconstant that aroused during the football match.

According to Simmons (2013), a referee is during a match influenced by experiences during communication processes that are more perceptible at younger and less experienced individuals. Communication takes a significant part of cognitive processes of personality and influences decision making during a match.

In addition, we had proven (Voborný & Zeman 2012) statistically significant correlation between the values of the component of anxious expectations and fears before the game (U1) and values of the component of depression and exhaustion after the match (D2). This correlation could be mediated by premature exhaustion of energy due to negative pre-start conditions (the pre-start fever, apathy). However, we had also pointed out possible dependence of both components (U1 and D2) on the referee's temperament.

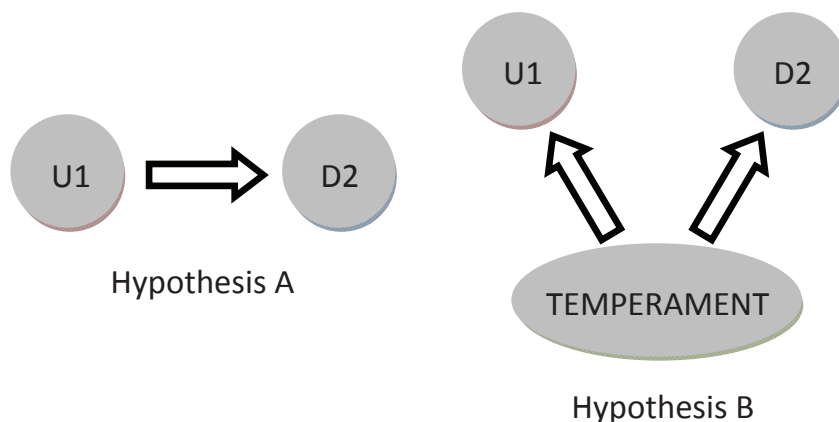
Now, our aim is to determine to what extent the observed correlation between components U1 and D2 actually results from negative pre-start conditions and to what extent it is just a manifestation of the referee's character. Therefore, the aim of our research is to verify whether it is possible to achieve adequate improvement in coping with mental burden associated with a football match in the referees by controlling their negative pre-start mental states.

## GOALS

The aim of our research was to test two hypotheses (Fig. 1):

**Hypothesis A:** Higher value of the component of anxious expectations and fears before the game (U1) conditions a higher value of the component of depression and exhaustion after the game (D2). Therefore, the negative pre-start conditions have influence on the experience of negative emotions after the game in the referees and by their control improvement in the management of mental burden associated with football games can be achieved.

**Hypothesis B:** There is no direct relationship between the values of the component of anxious expectations and fears before the game (U1) and the values of the component of depression and exhaustion after the game (D2). Therefore, the observed correlation is only a result of the influence of the referee's temperament on the values of both components. In this case the regulation of negative pre-start states would have no effect on the management of mental burden associated with football match.



**Figure 1:** Schematic expression of formulated hypotheses A and B, U1 marks the component of anxious expectations and fears before the game, D2 the component of depression after the game.

## METHODS

### Sample

The research sample consisted of 26 football referees, all of which were men. The age of all tested individuals was from 20 to 43 years. An average age was 32,5 years. Referees were divided into different groups according to the level of the game. Six referees were in category 1B, 10 referees were in A category and 10 referees were at the regional contest. Twenty four referees were college graduates. Two referees were university graduates.

These referees supervise competitions within the regional football association of Vysočina. It is one of 14 regional football associations in the Czech Republic.

Mental experiences and states of the referees could be influenced also by length of their practice (Fig. 2). In our sample referees with practice of 5–10 years were the most frequently

represented group (14 individuals), followed by the group of referees with practice of 10–15 years (7 individuals).

### Questionnaire SUPSO

For the evaluation of subjective mental experiences and states of football referees, we used a standardized questionnaire SUPSO (Mikšík, 2004). The referees always filled in the questionnaire at most 30 minutes before the start of the match and immediately after its ending. Each referee was observed in 5 matches.

The questionnaire SUPSO registers specific symptoms of subjective psychological experiences and states of the individual. Test includes 28 adjectives (e.g. calm, serene). Respondents are intended to express to what level they identify with particular adjectives on the scale from 0 to 4, where 0 means “nothing at all”, 1 is “slightly”, 2 is “moderately”, 3 is “very”, 4 is “very much”.

On the basis of the factor analysis Mikšík (2004) defined 7 components which are always saturated with 4 adjectives. The final score of each component is the sum of the scores of 4 respective adjectives. The components are following:

Psychological well-being (P)

Activity and vigorousness (A)

Impulsiveness, letting off steam (O)

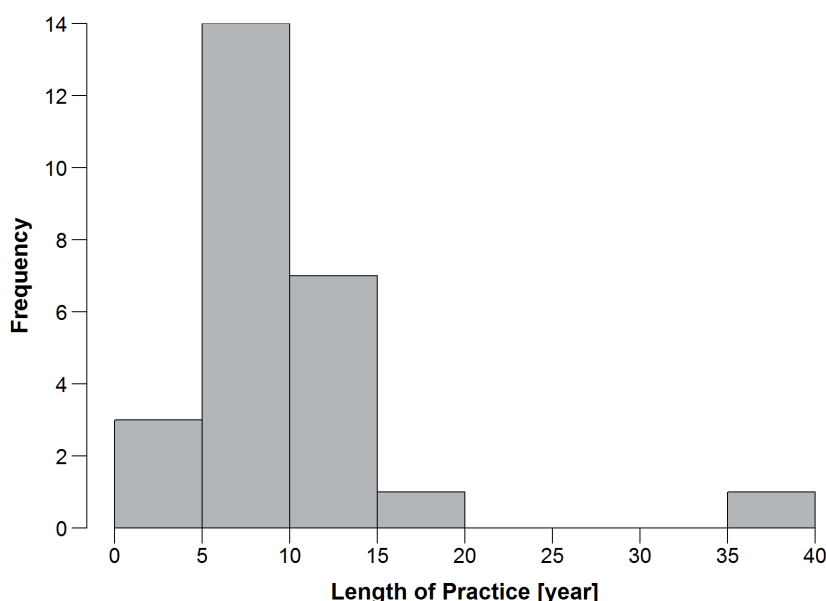
Mental restlessness, discomfort (N)

Depression, exhaustion (D)

Anxious expectations, fears (U)

Sadness (S)

The test has always been administrated before and after a match.



**Figure 2:** Length of practice of 26 football referees in our sample

### Belov's temperament test

We investigated the contribution of each temperament component of the personality of football referees using Belov's temperament test (1972). The test was used in the pilot study which was performed previously. Based on the experience with this test, we decided to use it even in this research study. The referees filled in the questionnaire at rest only on days when they did not

supervise any football match. The temperament of each referee was expressed as a percentage of particular temperament components of personality. This questionnaire seemed to be applicable for integration into the research. It is based on the Linder's temperament scale. Temperament components are connected to anxiety. The test was administered at the beginning of the research. A discussion with referees after the match was always a part of the research.

### Statistical methods

The values of sub-components of subjective experiences and states are not normally distributed. Therefore, we used Spearman's rank correlation coefficient and partial rank correlation for the statistical evaluation. To calculate the partial rank correlation coefficient we used linear regression models

$$U1 = b_0 + b_1M + b_2S + b_3C + b_4P \quad (1)$$

and

$$D2 = b_0 + b_1M + b_2S + b_3C + b_4P, \quad (2)$$

where U1 is the rank of component of anxious expectations and fears observed before the match, D2 component of depression observed after the match, M the rank of the percentage of melancholic temperament component of personality, S the rank of the percentage of sanguine temperament component, C rank of the percentage choleric component, P rank of the percentage of phlegmatic temperament component and  $b_0$ - $b_4$  are linear regression coefficients. Spearman's rank correlation coefficient between the residuals of the models (1) and (2) were computed.

The hypothesis of independence of calculated correlation coefficients with two-sided alternative was tested on the significance level of  $\alpha = 0.05$ . All statistical tests were performed using software STATISTICA (StatSoft, Inc. 2010), and R (R Core Team, 2013). In order to preserve the assumption of independence of random variables in the statistical tests, each match was evaluated separately.

## RESULTS AND DISCUSSION

Fig. 3 shows the percentage of the basic temperament components of the personality. We want to point out primarily the significantly weaker melancholic temperament component compared to the other components. Also the Spearman's rank correlation coefficient between the percentage of temperament components and the values of evaluated components U1 (tab. 1) and D1 (tab. 2) was calculated. The values of correlation coefficients were statistically inconclusive due to the small number of individuals ( $n = 26$ ). Given the sample size, only values of the correlation coefficient higher than 0.375, are statistically significant (Weathington, Cunningham & Pittenger, 2012). If the actual values of the Spearman's rank correlation coefficients are significantly lower than this threshold value, their statistical proof is unlikely. Nevertheless, the rank correlation between the variables can actually exist. This comes into play especially considering the correlation of the percentage of melancholic temperament component and the values of both evaluated components U1 and D2. The correlation coefficient values are also quite low in this case, but the values higher than or equal to 0.1 were found in nearly all matches and they always have the same sign. In the other components of temperament the situation is not so clear, correlation coefficient values are very low and their signs are different.

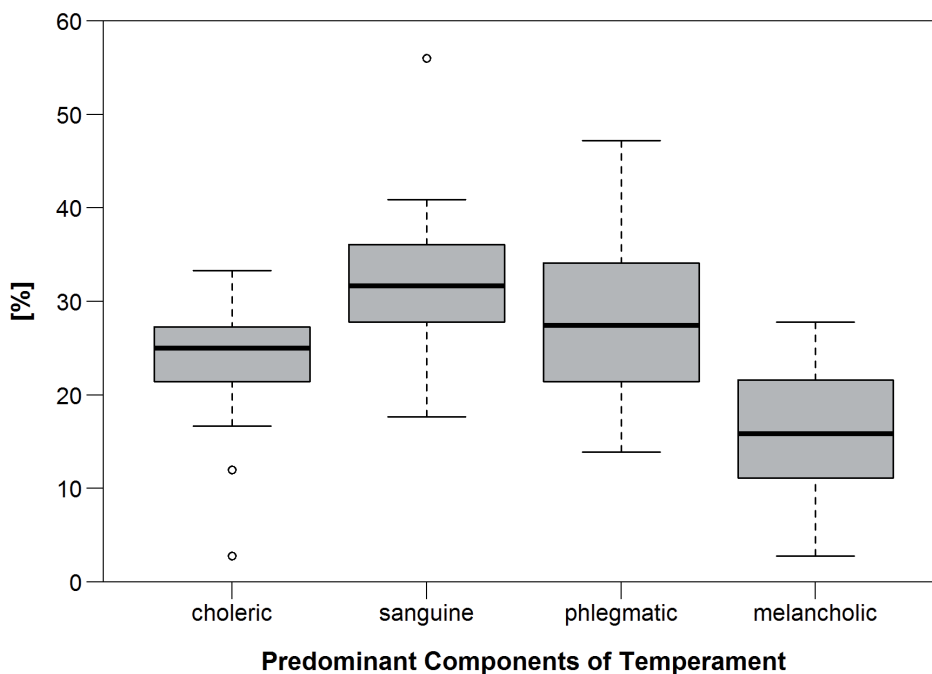
**Table 1:** Spearman's rank correlation coefficients between the values of the component of anxious expectations and fears before the game and the percentage of temperament components of the referee's personality

Component of Temperament [%]	1 <sup>st</sup> game <sup>a</sup>	2 <sup>nd</sup> game <sup>a</sup>	3 <sup>rd</sup> game <sup>a</sup>	4 <sup>th</sup> game <sup>a</sup>	5 <sup>th</sup> game <sup>a</sup>
C	0,05	-0,12	0,01	-0,09	0,04
S	-0,05	-0,01	0,17	0,20	0,13
P	-0,09	0,12	-0,20	-0,28	-0,22
M	0,19	0,03	0,13	0,33	0,19

Note. M = rank of the percentage of melancholic temperament component of personality, S = rank of the percentage of sanguine temperament component, C = rank of the percentage choleric component, P = rank of the percentage of phlegmatic temperament component.

<sup>a</sup> Each referee was observed in 5 games.

Values of partial rank correlation coefficients between components U1 and D2, excluding the influence of the rank of representation of temperament components of the referees' personalities, were calculated (tab. 3). None of the parameters of partial regression models was statistically significant, but this follows directly from the statistical insignificance of Spearman's rank correlation coefficients between the temperament components and values of components of subjective psychological experiences and states. The values of partial correlation coefficients after exclusion of influence of temperament are only a few hundredths lower than the corresponding values of the original Spearman's rank correlation coefficients in four out of five matches. In one case, the coefficient is statistically significantly different from zero.

**Figure 3:** Percentage of temperament components of personality of 26 male football referees from our research sample. The thick horizontal line indicates the median, the edge of the grey box shows the first and the third quartile and whiskers show range of inlier values. The temperament was expressed as a percentage of particular temperament components of personality of each referee (Belov, 1972)

The effect of multiple comparisons (Abdi 2007) does not allow a correlation between the two components to be considered statistically proven, nevertheless, the hypothesis A is much more likely to be considered. However, it will be necessary to expand the sample size of football referees (to at least 50 individuals) for its definitive confirmation.

In addition, substantive interpretation of ordinal random variables is difficult, which negatively affects the credibility of the results. Therefore, it would be useful to try to find such a scale in which the individual components of subjective psychological experiences and states would have at least approximately normal distribution. In this regard, it is possible to build on the correlation analysis of 28 adjectives included in the questionnaire SUPSO, which was performed by Mikšík and Bricháček (1984).

**Table 2:** Values of Spearman's rank correlation coefficients between the values of the component of depression after the game and the percentage of dominant temperament components of the referee's personality

Component of Temperament [%]	1 <sup>st</sup> game <sup>a</sup>	2 <sup>nd</sup> game <sup>a</sup>	3 <sup>rd</sup> game <sup>a</sup>	4 <sup>th</sup> game <sup>a</sup>	5 <sup>th</sup> game <sup>a</sup>
C	0,07	0,04	0,13	-0,01	-0,12
S	-0,10	-0,01	-0,09	0,11	-0,14
P	-0,05	0,01	-0,09	-0,24	0,04
M	0,16	0,10	0,22	0,34	0,34

*Note.* M = rank of the percentage of melancholic temperament component of personality, S = rank of the percentage of sanguine temperament component, C = rank of the percentage choleric component, P = rank of the percentage of phlegmatic temperament component.

<sup>a</sup> Each referee was observed in 5 games.

**Table 3:** Results of the test of independence of Spearman's rank correlation coefficient and the partial rank correlation coefficient between the values of the component of anxious expectations and fears before the game and the values of the component of depression after the game

U1 × D2	N	R	p-value	partial R	p-value
1 <sup>st</sup> game <sup>a</sup>	26	0,35	0,08	0,33	0,15
2 <sup>nd</sup> game <sup>a</sup>	26	0,28	0,17	0,24	0,23
3 <sup>rd</sup> game <sup>a</sup>	26	0,41*	0,04*	0,40*	0,04*
4 <sup>th</sup> game <sup>a</sup>	26	0,42*	0,03*	0,19	0,36
5 <sup>th</sup> game <sup>a</sup>	26	0,40*	0,05*	0,35	0,08

*Note.* U1 = component of anxious expectations and fears before the game, D2 = component of depression after the game, N = number of football referees in the research sample, R = Spearman's rank correlation coefficient, partial R = partial Spearman's rank correlation coefficient

<sup>a</sup> Each referee was observed in 5 games.

\*p < 0,05.

## CONCLUSION

We evaluated subjective psychological experiences and states in a group of football referees using a standardized questionnaire SUPSO (Mikšík 2004). Football referees (26 men) filled in the questionnaire right before the game and then immediately after its end. Each referee was evaluated in 5 matches. It had been previously found (Voborný et al. 2012) that due to taking part in the game the depression rate increases in referees, which can be interpreted as a result of extreme stress. It can be caused by a immoderate anxiety before beginning of the activity of a referee.



The aim of our research was to test validity of two hypotheses which were formulated based on theoretical knowledge of personality psychology:

1. Hypothesis A claims that values of the component of anxious expectations and fears before the game (U1) are closely correlated with values of the component of depression after the game (D2).
2. Hypothesis B claims that statistically proven rank correlation between components U1 and D2 is indirect and it is a result of the influence of the referee's temperament on the subjective psychological experiences and states.

Based on the performed statistical tests the following can be stated:

1. If there is a direct rank correlation between the values of the components U1 and D2, it is low to medium and for its analysis using partial correlation coefficient a group of 26 individual is insufficient. It will be necessary to extend this sample to at least 50 football referees.
2. Current results suggest the validity of hypothesis A, which have yet to be statistically verified on an expanded sample of football referees. It is likely that the pre-start fever, represented by the component of anxious expectations and fears before the game in our study, has an immediate impact on the management of mental burden, represented by the component of depression after the game
3. It will be good to create such an evaluation scale that would give normally distributed random variables, since the rank random variables are difficult to objectively interpret.
4. It can be declared that the pre-start state represented in our study by component of anxious expectations and fears before the match has a direct influence on dealing with mental stress represented by component of depression after a finished match.

It emerges from our research that it is essential to work with referees on increasing the level of frustration tolerance so that they will be able to resist experiences of anxiety. Therefore, we recommended incorporating training session of coping strategies in order to deal with stress situations. This has a positive influence on health and quality of life of a football referee.

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